DOCUMENT RESUME

ED 255 227 IR 051 074

AUTHOR	McCandless, Patricia; And others
TITLE	University of Illinois Library. The Invisible User: User Needs Assessment for Library Public Services. Final Report from the Public Services Research Projects.
INSTITUTION	Association of Research Libraries, Washington, D.C. Office of Management Studies.; Illinois Univ., Urbana. University Library.
SPONS AGENCY	General Electric Foundation, Ossining, N.Y.
PUB DATE	Jan 85
NOTE	63p.; For related documents, see IR 051 055 and IR 051 066-074.
AVAILABLE FROM	Association of Research Libraries, Office of Management Studies, 1527 New Hampshire Ave., NW, Washington, DC 20036 ($15.00 per copy, prepaid).
PUB TYPE	Viewpoints (120) -- Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Academic Libraries; Computers; Higher Education; *Information Needs; Information Retrieval; Input Output Devices; *Intellectual Disciplines; Library Planning; Library Services; *Needs Assessment; *Online Systems; Reference Services; Self Evaluation (Groups); Technology Transfer; *User Satisfaction (Information); Use Studies
IDENTIFIERS	End Users; Online Catalogs; *University of Illinois Urbana Champaign

ABSTRACT

Arguing that the development of interactive communication systems with microcomputers and computer terminals has created new challenges for public services in academic libraries, the University of Illinois at Urbana-Champaign conducted a needs assessment survey to determine if users of computer-based systems have different needs and expectations for public services than individuals who do not regularly use such systems. Results of a mail and online survey reveal that, while users are fairly traditional in their methods of access to information, those who do use computer-based systems currently are not only finding ways to access information without the library as an intermediary, but they are also interested in seeing this type of service expanded. Following a literature review and discussion of survey methodology, the report is divided into three parts: (1) research results by setting, demographics, means of accessing information, enhancements, and online searching; (2) evaluation of research in terms of traditional library services, online bibliographic services, services to electronic users, and design issues; and (3) implications for new services, the role of the librarian, research as a management tool, and future research directions. Numerous tables compare the survey results by academic discipline (humanities, sciences, social sciences) and by method of survey response (mail or computer). A 23-item bibliography and the questionnaire are included. (Author/THC)

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PUBLIC SERVICES IN RESEARCH LIBRARIES

FINAL REPORT FROM THE PUBLIC SERVICES RESEARCH PROJECTS

University of Illinois

Project sponsored by the General Electric Foundation

Office of Management Studies
Association of Research Libraries
Washington, D.C.
January, 1985

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Seven Association of Research Libraries (ARL) members conducted research on current public services concerns, as part of a Public Services in Research Libraries Project sponsored by the General Electric Foundation and operated by ARL's Office of Management Studies.

Research grants of up to $4,000 were provided for the projects, which were selected in part because of their potential usefulness to academic and research libraries. The subjects include the integration of online catalogs into public services, identification of the unique instructional and research needs of students and faculty in particular disciplines, and the impact of technology on both library users and staff members.

The Public Services in Research Libraries Project was financed by a $250,000 two-year grant from the General Electric Foundation. Now, the Office of Management Studies is offering academic libraries a series of aids to analyze, improve, and adapt their public services programs to changing economic, technological, and user needs. The aids include an assisted self-study process and training activities to benefit public services staff.

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THE INVISIBLE USER:

USER NEEDS ASSESSMENT FOR LIBRARY PUBLIC SERVICES

The University of Illinois at Urbana-Champaign

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Association of Research Libraries
Washington, D.C.
February, 1985

ACKNOWLEDGEMENTS

We would like to thank other colleagues who have worked with us during the course of the project. Mary Frances Collins, currently Director of Technical Services at the University of Minnesota, served as the catalyst for the project which began while she was the Director of Public Services at the University of Illinois at Urbana-Champaign. Phyllis Self and Nancy Allen during their tenure as Assistant Director of Life Sciences Libraries and Acting Assistant Director of Social Sciences Libraries, respectively, also contributed much to the study. And finally, a special acknowledgement to all the faculty members and students at the University of Illinois at Urbana-Champaign who patiently responded to our survey, thereby providing us with the data presented in this report. We hope their responses will help improve services to all users of the library.

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Abstract

The development of inter-active communication systems coupled with microcomputers and computer terminals has created new challenges for public services in academic libraries. Data collected in a needs assessment survey at the University of Illinois at Urbana-Champaign is examined to ascertain if users of computer-based systems have different needs and expectations for public services than individuals who do not regularly use such systems. Results reveal that while users are fairly traditional in their methods of access to information, those who do use computer-based systems currently are not only finding ways to access information without the library as an intermediary, but these invisible users are also interested in seeing these types of services expanded.

INTRODUCTION

Computer technology has clearly had a tremendous impact on library services in both technical and public service areas. No longer an arguable point for most people, it is less clear how these continuing rapid advances in automation will impact on librarians. While the earlier effects of mainframe automation, particularly on technical service operations, have been well documented, perhaps the most remarkable way in which computer evolution is now beginning to affect libraries is through the development of relatively inexpensive and powerful microcomputers. This development is allowing an increasing number of individuals access to library databases and services without requiring the mediation of library personnel or use of library access equipment. In effect, a radically decentralized information process is being created.

At the University of Illinois at Urbana-Champaign, librarians have begun to explore the degree to which it is possible to develop and provide both appropriate and effective

public services in this new decentralized context. What concerned us most was the realization that so much of our perception of patrons' needs, and consequently the kinds of services we were providing, was limited to our interaction with patrons within the traditional library context. Even the use of large mainframe computer systems to support such public service library operations as automated circulation and an online catalog required the majority of patrons to come into the library to use the terminals to accesss the system. By mediating the use of these automated systems as well as through the more traditional interactions with patrons when providing reference and circulation services, librarians have felt confident that they have kept in touch with patrons' needs and problems.

However, the increasing popularity of personal computers and terminals in homes and offices accompanied by an increased demand for end-user capability and more dialup ports to our online circulation system (LCS), began to suggest that such traditional library-centered methods of feedback might no longer be sufficient. For instance, a patron with a home or office personal computer or terminal at the University of Illinois can dial into the LCS database, search the library's holdings and remotely request a book be delivered to a campus office. A similar pattern of decentralized use outside of the library is also beginning to emerge nationally as vendors of bibliographic search services have begun to focus their appeal to the home market. Although such decentralized use might represent only a subgroup of the same patrons who come into the library, these remote library users could just as easily reflect a new library constituency with very different needs and concerns from traditional library users. The question was whether there might not be a growing population of library patrons who are active library and information users, but who seldom or never interact with a librarian or even come into the library and whose information needs and concerns are different from those of traditional library users. These invisible users, users of information and library resources through remote electronic channels, became the focus of a study designed to begin answering some of these questions.

The study, funded by the Office of Management Studies of the Association of Research Libraries, was undertaken in the spring of 1984 at the University of Illinois at Urbana-Champaign by the members of the Departmental Library Services Director's Council, an administrative body composed of the Director of Departmental Library Services and five Assistant Directors, four representing clusters of subject related libraries and one representing undergraduate services. Each Assistant Director is the head of a departmental library and also has the administrative assignment of working with the members of his/her Council libraries.

LITERATURE REVIEW

Investigations of how scholars and practitioners seek and use information are a familiar part of the literature of library and information science. Over the past four decades, a considerable body of knowledge concerning the behavior of different kinds of user groups has been developed. Generally these studies fall into two groups: they are either studies of scientists in a particular discipline or studies of all the scientists at a particular research institution. Reviews of these studies have been published by Wood (1971), Bates (1971), Faibisoff and Ely (1976), and in the volumes of the Annual Review of Information and Science and Technology (1968-78).

Use studies were first undertaken in the sciences, with the earliest dating from the late 1940's. Menzel (1960) reviewed these early studies in his book and in the first volume of the Annual Review of Information Science and Technology (1966). It was not until the 1960's that attention turned to the social sciences through such studies as Paisley's (1965). By far the most thorough analysis of social science user studies is that of Brittain (1970). Again, many of the studies were of researchers in a particular discipline, such as anthropology or political science, or of people in applied fields such as business executives. Two studies with broader scope were those of the American Psychological Association (1963-1969) and the INFROSS project (Line, 1971).

The American Psychological Association (APA) study examined all aspects of the flow of information in psychology, including both formal and informal communication, especially at conventions and through the printed reports issued by the Association. The reports of this study reveal a complex model of the information dissemination process and of the amount of time that elapsed between the generation of information and its retrieval through secondary sources (American Psychological Association 1963-1969).

The second study, the INFROSS project, was intended to investigate all aspects of information needs and uses in a national sample of British researchers and practitioners in nine social sciences: psychology, statistics, geography, education, history, political science, sociology, economics, and anthropology. As in the APA study, the INFROSS research (1971) examined both informal and formal information gathering activities and sought to assess how well these satisfied users' needs. Generally, the needs of the social scientists were similar enough that a single information system could probably be designed for all the social sciences; however, there was a gap between pure research and applied social science. The differences among the disciplines were less than

the differences between researchers and practitioners.

As the reviews by Bebout, Davis, and Oehlerts (1975) and Stone (1982) indicate, user studies in the humanities began to be undertaken about the same time as those in the social sciences, though there are far fewer of them. These, too, are a mixture of studies of individual disciplines and of humanists in general.

From the user studies in all these areas, a composite picture of the information-related behavior of the researcher emerges (Table 1). The pattern of information flow is similar for the sciences, the social sciences, and the humanities; they use similar materials, though the emphases differ; they have similar methods for retrieving information; and libraries or librarians are seldom their first resource. They begin their information seeking in their local environment and expand beyond that when it fails to produce the desired results. They often are unaware of existing sources and of what they can expect from the library. They value services that are convenient, responsive, and offer the possibility of dialogue.

In addition to being cognizant of the literature on library use, the investigators needed information on effective methods to be used to query a sample of invisible users. Online databases were searched to identify material on invisible users or patrons; use of computers in surveys for management decisions; electronic libraries, and electronic communications, messaging, mail, bulletin boards, conferences, questionnaires or surveys. These searches did not produce any citations of studies on invisible users and only a few relevant citations in the areas of electronic communications, electronic mail, computer conferencing, and computer administration of questionnaires and tests.

Evans and Miller (1969) conducted an experimental study to determine whether or not the administration of questionnaires by means of a computer would result in more candid and honest responses than those administered by conventional methods. The findings showed that on questions of a personal nature or those which were possibly disturbing, those who answered the computer questionnaire did so with greater honesty and candor than did those answering using conventional means, although there were no significant differences in response tendencies of the two groups on factual questions. The authors concluded that the use of computers need not be limited to data processing but could be used for data gathering as well.

TABLE 1: Generalized Profile of Information-Seeking Behavior

Behavior	Scientist	Social Scientist	Hypotheses About Humanist
Information sources:	Most useful sources are journals, plus trade literature and handbooks. Informal contact is valuable.	Uses monographs and journals to a great extent. Informal personal contact is valuable.	Uses monographs more than journals. Informal personal contact is valuable. Older material more important than in the social sciences or science.
Methods of locating references:	In rank order: personal recommendations, chance, and abstract indexes are the most used methods. The use of the library information department is not important.	In rank order: citation, abstracts/ indexes, and personal recommendations are the most used methods. The use of the library is not important.	In rank order: indexes, personal recommendation, chance. The use of the library is important.
Use and function of abstract journals:	Scientists use abstract journals slightly less than social scientists. Both use them to a similar extent for current awareness.		Fewer abstract journals available in humanities. Use for current awareness.
Attendance at, and value of conferences:	Both attend conferences to a similar extent. Pure scientists gained information from social contacts, applied scientists from the papers presented.	Information gained through social contacts and papers presented.	Attend conferences. Information gained through social contacts. Few papers presented are valuable.
Delegation of literature searching:	Tends to delegate searching	Tends to conduct own research.	Tends to conduct own searching.
Late detection of information:	Both experience instances of late detection to a similar extent.		Experiences instances of late detection.
Linguistic ability:	Linguistic ability of scientists and awareness of the language is greater than that of social scientists.		Linguistic ability is greater than that of scientists and social scientists.
Stimulus for research/ideas:	Written material, own work, and informal personal contact are important for both scientists and social scientists.		Same.

Note. From Bebout, L., Davis, D., Jr., and Oehlerts, D. (1975).

A similar study by O'Brien and Dugdale (1978) used two matched groups of women to respond to a computer questionnaire and to a conventionally administered questionnaire on bathing habits for market research data. They found that there was a slight tendency for respondents to be more frank on the computer questionnaire and also to use the extreme values on a scale than did those who responded by means of an interview questionnaire. Although there were small differences between the two sets of responses, they were consistent across the whole questionnaire. Again, the authors concluded that computers had a role in market research to elicit data as well as to analyze it.

In the mid 1970's the Institute for the Future in Menlo Park, California (1974-1978) issued a series of studies on group communication through computers. These studies explored the possibility of supporting decision makers through group communication via computer networks. The studies revealed that the interaction within conferencing groups represented new patterns of association which were different from those of face-to-face conferences and that it was technically feasible to integrate large scale databases within the context of ongoing conferences. The authors believed that the most important finding was the impact of computer-based communication on work patterns and the potential for a network of persons working in dispersed locations.

During the late 70's and early 80's a number of authors (Hiltz and Turoff 1978, Kerr and Hiltz 1982) wrote about computerized conferencing, especially the Electronic Information Exchange System (EIES).

Hiltz (1977) reported the social impact of computer conferencing by describing the remoteness and impersonality of the process which at the same time permitted self-activation and self-paced participation. She also discussed the possible restructuring of invisible colleges and the formation of new groups that had not previously existed. One year later Hiltz (1978) compared computer conferencing to video and audio conferencing. Computer conferencing was competitive with the others in terms of giving and receiving information, exchanging opinions, and generating ideas. For bargaining, persuading, and getting to know someone, the participants preferred face-to-face meetings. They reported problems with mastering the keyboard and the mechanics of the system and adjusting to changes in the social dynamics of communication.

Following a group of scientific users of EIES for a 18-24 month period, Hiltz (1981) made some interesting observations. There was a constant turnover in group membership and changes in the nature of the system, and non-responses on questionnaires provided incomplete data. She concluded that

the strongest predictors of acceptance of computerized conferencing are attitudinal and motivational rather than any objective characteristics of the users. Scientists tended to report an increase in total communication within a speciality and an increase in contacts across disciplines or specialities. The application of computers to conferencing is likely to fail if a group does not have one or more persons to take the responsibility for an active leadership role.

Discussing management applications of electronic mail, Hustands (1982) notes messages are shorter and more to the point than face-to-face discussions and often result in clearer, more effective communications. He concluded that the greatest advantage of this type of communication is the opportunity to focus on ideas, not on the person presenting the ideas.

Although these studies discussed the pros and cons of using computer questionnaires and conferences, and electronic mail, none discussed the design of questionnaires, conference design or other details involved in their use.

METHODOLOGY

The study was designed to fulfill a dual purpose. First, it was essential to find out more about invisible users. How large a group did they represent, how did they differ from traditional library users (if at all), and finally what were their information gathering habits and needs? Second, because it was felt that the mechanism for surveying such a group presented some unique issues, it was neccessary to explore some new methodological areas as well--namely, the use of an online survey with a possible follow-up and refinement of the survey data through computer conferencing.

The vehicle for the first phase of the study, data collection, was a needs assessment survey questionnaire distributed both in the traditional paper format and in an online format on the University of Illinois at Urbana-Champaign's (UIUC) CYBER and PLATO mainframe computer networks. Questions centered on four areas: demographics of the information user population, computer resources available to and patterns of computer use by this population, current methods used to access library and bibliographic information and types of information system enhancements they would like to have the library provide. After pre-testing both the paper and the online version of the questionnaire, the survey was begun in the spring of 1984. The paper questionnaire was mailed to a stratified random sample of 1,200 teaching faculty. This sample was stratified by academic discipline to ensure a representative distribution from the sciences, the

humanities and the social sciences with both librarians and teaching faculty from the School of Library and Information Sciences included in the social science group. At the same time the online version of the questionnaire was mounted on the UIUC's CYBER 175, the primary mainframe for the campus and one to which both faculty and students have easy and no-charge access, and the UIUC's PLATO system which also allows students and faculty easy access without charge.

Six hundred and fifteen paper questionnaires were returned in addition to four blank questionnaires from individuals who indicated that they had responded to the questionnaire electronically. These questionnaires represented a response rate of 51.3%. The online questionnaire, available to any faculty, staff or student who wished to complete it, was answered by 71 CYBER and 37 PLATO users out of a population of unknown size. The much lower response rate to the online version of the questionnaire can be in part explained by the inability of either the CYBER or the PLATO system to notify users as they signed on that the library's questionnaire was available. Instead it was necessary to rely on notices in all-user electronic bulletin boards. Consequently, only those individuals who checked those online bulletin boards were aware of the questionnaire's existence. A copy of the paper version of the questionnaire appears in the Appendix. The questions were identical for both the paper and electronic versions.

The researchers developed the questionnaire with the assistance of the University's Survey Research Laboratory and contracted with a local firm to load the questionnaire on CYBER and PLATO and transfer and code the responses. Due to the large volume of data generated and the pressure of time constraints, it became necessary to forego further refining of the data through teleconferencing. Consequently, the single pass responses to both the paper and the online questionnaires were coded and analyzed using SPSS software. Data were analyzed by discipline (humanities, sciences and social sciences) and by method of response (paper, CYBER, PLATO). Because of the relatively small number of responses to the CYBER and PLATO versions of the questionnaire, these responses have been collapsed for reporting purposes into a single online category. While crosstabulations using the SPSS software were computed, they have no statistical significance.

RESEARCH RESULTS

Setting

Established in 1867, the University of Illinois at Urbana-Champaign remains the largest and most prestigious

public institution of higher learning in the state. The University has an enrollment of 35,000 students of whom 9,000 are professional and graduate students. The diverse curricula, including 87 doctoral programs, are taught by over 2400 faculty.

With a collection of 5.5 million volumes, the library is the third largest academic library in the United States. At the heart of the library are the departmental and special libraries which number 38. The staff of the library numbers 532 with 119 librarians, who hold full faculty rank. Currently the library is in a phase of rapid automation, including an automated circulation system and an online catalog.

Demographics

Although individuals were asked to identify their specific department when they responded to the questionnaire, it quickly became apparent that comparing users by individual departments did not provide large enough sets to be meaningful in determining user patterns and needs. Therefore, the respondents were clustered into three broad groups: humanities, sciences, and social sciences corresponding with the stratified random sample of the mail questionnaire. In addition, librarians were separated out as a distinct group to ascertain their thoughts on methods of accessing information and possible ways of extending service via electronic systems.

Response to the questionnaire from faculty by rank closely approximated the campus-wide distribution although a slightly lower proportion of responses was received from professors and a slightly higher percentage from associate professors (Table 2).

TABLE 2

Faculty Population and Respondents by Rank

Rank	Campus Faculty N	%	Respondendents N	%
Professor	1168	47.5	270	43.5
Associate Professor	668	27.1	194	31.3
Assistant Professor	625	25.4	156	25.2

The male-female ratio of response also remains rather constant with the exception of a lower response for males who are full professors (Table 3).

TABLE 3

Faculty Population and Respondents by Rank and Sex

Rank	Campus Faculty				Respondendents			
	Male		Female		Male		Female	
	N	%	N	%	N	%	N	%
Professor	1108	45.0	60	2.4	206	40.2	15	2.9
Assoc. Prof.	551	22.4	117	4.8	127	24.8	29	5.6
Asst. Prof.	428	17.4	197	8.0	82	16.0	54	10.5

When the responses are examined by discipline the pattern remains relatively consistent with the distribution which exists within each of the broad categories on the campus. (Table 4).

TABLE 4

Faculty Response by Discipline

Rank	Science		Social Science		Humanities		Librarians	
	N	%	N	%	N	%	N	%
Professor	108	49.8	90	45.7	64	39.3	6	14.6
Assoc. Prof.	53	24.4	61	31.0	67	41.1	13	31.7
Asst. Prof.	56	25.8	46	23.4	32	19.6	22	53.7

The response rate between males and females is also similar to the ratio that exists within each of the subject categories (Table 5).

TABLE 5

Faculty Responses by Discipline and Male/Female Ratio

Gender	Science		Social Science		Humanities		Librarians	
	N	%	N	%	N	%	N	%
Male	218	87.2	153	80.5	129	83.2	15	38.5
Female	32	12.8	37	19.5	26	16.8	24	61.5

In the remainder of the demographic questions the information is separated by the method of response as well as by discipline. When the respondents were examined in terms of discipline, the scientists represent a slightly younger group (Table 6).

TABLE 6

Age of Respondent by Discipline

Age	Science		Social Science		Humanities		Librarians	
	N	%	N	%	N	%	N	%
16-25	27	9.9	4	2.0	4	2.4	0	0.0
26-35	73	26.7	49	23.9	30	17.6	10	23.8
36-45	78	28.6	62	30.2	49	28.8	11	26.2
46-55	55	20.1	50	24.4	56	32.9	14	33.3
56-55	35	12.8	35	17.1	27	15.9	7	16.7
65+	5	1.8	5	1.8	4	2.4	0	0.0

When the respondents are examined by method of response, major variations appeared between those who responded on paper compared with those who responded electronically (Table 7).

TABLE 7

Age of Respondent by Method of Response

Age	Paper		Electronic	
	N	%	N	%
16-25	2	0.3	36	33.3
26-35	118	20.1	45	41.7
36-45	182	31.0	18	16.7
46-55	171	29.1	4	3.7
56-55	101	17.2	3	2.8
65+	13	2.2	2	1.9

The electronic respondents contained proportionately more students, shifting the age downward, so that almost half the electronic respondents fall into the 26-35 year age group.

A large proportion of those answering the questionnaire, regardless of format, reported access to computer resources. Overall, the respondents reported that 72.6% have access to a terminal and 61.4% have access to a microcomputer. Most reported equipment available in their department, followed by their office, and 30% reported having hardware at home. Slightly more than half the respondents reported using the CYBER while a quarter use the IBM mainframe; slightly under 20% use PLATO, while fewer than 10% reported using a mainframe located off campus.

Analysis by discipline revealed that scientists and librarians reported greater access to both microcomputers and terminals, while the humanists reported the least access (Tables 8, 9, 10). Thirty percent of the total population reported having a microcomputer or terminal at home. Scientists reported having equipment at home more frequently than did the other disciplines. Overall, the scientists are heaviest users of all mainframes.

TABLE 8

Computer Access by Discipline

Mode of Access	Science		Social Science		Humanities		Librarians	
	N	%	N	%	N	%	N	%
Microcomputer	198	70.5	131	59.8	80	45.5	32	76.2
Terminal	230	81.9	162	74.0	93	52.8	35	83.3
Have Modem	165	58.7	115	52.5	54	30.7	28	66.7

TABLE 9

Location of Equipment by Discipline

Location	Science		Social Science		Humanities		Librarians	
	N	%	N	%	N	%	N	%
Office	148	52.7	75	34.2	32	18.2	25	59.5
Department	135	48.0	107	48.9	81	46.0	24	57.1
Home	102	36.3	67	30.6	38	21.6	8	19.0

TABLE 10

Mainframe Access by Discipline

Mainframe	Science		Social Science		Humanities		Librarians	
	N	%	N	%	N	%	N	%
CYBER	194	69.0	127	58.0	49	27.8	17	40.5
PLATO	64	22.8	41	18.7	25	14.2	6	14.3
IBM	75	26.7	53	24.2	34	19.3	10	23.8
Off-campus Mainframe	33	11.7	15	6.8	10	5.7	10	23.8

When access was studied in terms of response, those who responded electronically have considerably more computer access, including equipment at home (Tables 11, 12, 13). The high proportion of scientists among the electronic responses accounts for a profile of response to access which parallels the overall response from scientists.

TABLE 11

Computer Access by Method of Response

Mode of Access	Paper		Electronic	
	N	%	N	%
Microcomputer	368	59.8	76	70.4
Terminal	419	68.1	106	98.1
Have Modem	283	46.0	81	75.0

TABLE 12

Location of Equipment by Method of Response

Location	Paper		Electronic	
	N	%	N	%
Office	197	32.0	86	79.6
Department	286	46.5	65	60.2
Home	163	26.5	54	50.0

TABLE 13

Use of Mainframe by Method of Response

Mainframe	Paper		Electronic	
	N	%	N	%
CYBER	306	49.8	86	79.6
PLATO	83	13.5	54	50.0
IBM	126	20.5	50	46.3
Off-campus Mainframe	44	7.2	24	22.2

When number of hours spent on computer activities are tabulated, more respondents use a mainframe and for a greater period of time than they perform the same activity on a microcomputer with two exceptions. Twice as many people use a microcomputer for word processing although the median time for word processing on a microcomputer or a mainframe is about the same. Personal management also is generally handled on a microcomputer with the median time on a microcomputer slightly greater (Tables 14 and 16).

TABLE 14

Median Hours of Microcomputer Activity by Method of Response

Activity	Paper		Electronic	
	N	Hrs/Wk	N	Hrs/Wk
Word Processing	198	4.55	40	4.90
Personal Research	125	2.44	57	4.64
Data Analysis	76	2.13	27	4.80
Adminstrative Management	32	2.07	10	2.25
Modeling	29	1.88	12	8.83
Instruction	59	1.75	21	5.00
Programming	71	1.61	62	5.00
Graphics	40	1.50	26	1.50
Machine Readable Databases	32	1.44	21	2.25
Personal Management	31	1.41	22	1.83
Games	17	1.35	20	2.25
Electronic Mail	19	1.23	12	2.17
Creative Work	7	1.20	13	1.67

The electronic respondents use mainframes much more than they use microcomputers, almost twice as much for many activities. The median time spent for each activity is also greater on a mainframe. Those who responded electronically are more likely to use a mainframe for word processing. However, three times as many people who responded on paper use a microcomputer for word processing rather than using a mainframe for that activity (Tables 15 and 17).

TABLE 15

Median Hours of Mainframe Activity by Method of Response

Activity	Paper		Electronic	
	N	Hrs/Wk	N	Hrs/Wk
Word Processing	62	3.25	59	4.77
Creative Work	3	3.25	10	2.17
Data Analysis	126	2.57	57	5.33
Modeling	37	2.42	30	4.50
Personal Research	114	2.20	77	5.28
Programming	63	2.14	82	10.17
Graphics	32	1.79	43	1.75
Instruction	73	1.77	47	4.85
Machine Readable Databases	39	1.48	38	4.79
Electronic Mail	28	1.24	69	2.36
Personal Management	10	1.13	23	1.46
Adminstrative Management	16	1.07	33	4.25
Games	2	1.00	41	2.43

TABLE 16

Median Hours of Microcomputer Activity by Discipline

Activity	Science		Social Science		Humanities		Librarians	
	N	Hrs/Wk	N	Hrs/Wk	N	Hrs/Wk	N	Hrs/Wk
Word Processing	49	4.33	80	4.25	38	8.00	18	2.10
Modeling	25	4.00	11	2.00	3	3.00	0	0.00
Personal Research	93	3.11	47	2.44	25	3.33	14	1.90
Programming	85	2.92	36	1.83	17	3.00	1	5.00
Data Analysis	56	2.37	35	1.94	4	4.50	5	2.25
Instruction	35	2.06	131	1.81	9	2.25	2	6.00
Machine Readable Databases	24	1.94	15	1.18	5	1.75	8	2.50
Games	21	1.75	10	1.33	4	1.50	0	0.00
Electronic Mail	14	1.70	13	1.22	0	0.00	2	1.00
Creative Work	12	1.50	1	1.00	6	1.50	0	0.00
Graphics	40	1.46	17	1.35	8	2.50	0	0.00
Adminstrative Management	10	1.33	12	1.90	10	2.25	8	3.50
Personal Management	27	1.29	17	1.75	5	2.00	3	2.00

TABLE 17

Median Hours of Mainframe Activity by Discipline

Activity	Science		Social Science		Humanities		Librarians	
	N	Hrs/Wk	N	Hrs/Wk	N	Hrs/Wk	N	Hrs/Wk
Programming	89	5.06	35	3.00	17	14.75	0	0.00
Modeling	46	3.50	11	2.00	7	2.00	0	0.00
Personal Research	103	3.44	54	4.50	24	5.00	7	1.75
Machine Readable Databases	25	3.25	31	1.75	10	2.17	10	2.17
Word Processing	50	3.00	39	3.43	26	5.21	2	2.00
Electronic Mail	54	2.50	22	1.23	15	1.63	2	1.00
Data Analysis	87	2.47	69	4.25	20	3.50	4	2.00
Games	26	2.30	8	1.30	7	4.75	0	0.00
Instruction	65	2.29	33	2.31	17	2.15	2	3.00
Graphics	50	2.04	13	1.09	10	2.17	1	1.00
Creative Work	4	2.00	1	5.00	7	2.75	0	0.00
Adminstrative Management	28	1.83	11	4.00	6	2.50	1	2.00
Personal Management	19	1.29	6	1.25	5	1.33	1	2.00

So, despite the popularity of home computers and the growing sales of microcomputers, computer usage at the University of Illinois in the spring of 1984 was largely performed on a mainframe. Future surveys will need to determine if this pattern remains constant or shifts to greater microcomputer use.

Means of Accessing Information

One of the objectives of the study was to examine user needs in the context of developing electronic technology within the library. Had computers affected the information gathering processes defined in earlier user studies?

Examining how individuals access information reveals that scientists, social scientists, and humanists identified consulting one's own books, using references and bibliographies found in books or journals, and consulting the card catalog as the most frequently used means of accessing information. Those in the sciences also reported consulting colleagues as an important resource (Table 18).

The next cluster of responses is the most divergent as to frequency of use. In descending order, individuals in the humanities find the following most useful for accessing information: use reference books, browse stacks, consult a colleague, consult library staff, search indexes, search LCS in the library. Scientists, in contrast, use indexes; consult library staff; browse stacks, use reference books, search LCS in the library. Social scientists use indexes, use reference books, consult library staff, search LCS in the library, browse stacks.

The importance of each of the methods of accessing information is given in Table 19. Using a three point scale with three representing the most important, scores were averaged to determine the ranking of the responses for the two groups. The weighted rankings emphasize the differences in the importance of the means of accessing information. Somewhat disappointingly, all three of the discipline groups, science, social science, and humanities, did not feel that consulting library staff was particularly important in accessing information. This fact is particularly distressing since at least 70% of each group did report consulting with library staff. Also considered as not important by all three groups was browsing the bookstacks. Scientists also found consulting reference books of little use while social scientists were not particularly enamoured with online searching within the library setting. The list of least important means of accessing information was much longer for those in the humanities, who found consulting a colleague; using LCS

TABLE 18

Present Means of Accessing Information by Discipline

Means of Access	Science			Social Science			Humanities			Librarians		
	Rank	N	%	Rank	N	%	Rank	N	%	Rank	N	%
Consult Own Books	1	264	94.0	1	202	92.2	1	163	92.6	4	39	92.9
Consult Colleague	2	243	86.5	4	183	83.6	6	135	76.7	4	39	92.9
Consult Card Catalog	3	241	85.8	2	192	87.7	2	161	91.5	1	42	100.0
Use References in Books or Journals	4	234	83.3	3	189	86.3	3	157	89.2	3	40	95.2
Search Indexes & Abstracts	5	215	76.5	5	168	76.7	8	124	70.4	7	35	83.3
Consult Library Staff	6	196	69.8	7	157	71.7	7	127	72.2	7	35	83.3
Browse Stacks	7	178	63.3	8	152	69.4	5	141	80.1	7	35	83.3
Use Library Reference Tools	7	178	63.3	6	159	72.6	4	143	81.2	4	39	92.9
Search LCS in Library	9	164	58.4	9	148	67.6	9	118	67.0	1	42	100.0
Search Online Bibliographic Databases in the Library	10	101	35.9	11	57	26.0	11	35	19.9	10	26	61.9
Search LCS Outside Library	11	80	28.5	10	81	37.0	10	69	39.2	11	14	33.3
Search Online Bibliographic Databases Outside Library	12	46	16.4	12	27	12.3	12	16	9.1	12	12	28.6

N = the number of "yes" responses to each specific question.
The percentage is the expression of the number of "yes' responses.

TABLE 19

Importance of Means of Accessing Information by Discipline

Means of Access	Science		Social Science		Humanities		Librarians	
	Rank	Weight	Rank	Weight	Rank	Weight	Rank	Weight
Consult Own Books	1	2.64	1	2.70	1	2.76	2	2.60
Use Bibliographies or References in Book	2	2.53	2	2.63	2	2.67	6	2.51
Search Indexes & Abstracts	3	2.30	5	2.32	6	2.14	3	2.57
Consult Colleague	4	2.28	7	2.23	7	2.07	7	2.46
Search LCS in Library	5	2.26	3	2.35	4	2.37	1	2.74
Consult Card Catalog	6	2.22	3	2.35	3	2.63	5	2.52
Search Online Bibliographic Databases in the Library	7	2.25	11	1.96	11	1.91	8	2.42
Search LCS Outside Library	8	2.24	6	2.29	9	2.04	12	1.86
Search Online Bibliographic Databases Outside Library	8	2.24	8	2.20	12	1.50	9	2.31
Use Library Reference Tools	10	1.96	9	2.11	5	2.24	4	2.56
Consult Library Staff	11	1.87	10	2.01	10	1.98	10	2.23
Browse Stacks	12	1.83	12	1.90	8	2.06	11	1.97

outside the library; and searching online databases in any setting of little importance. While our findings coincide very closely with other user studies it should be noted that those in the humanities, at least at the University of Illinois, do not fully exploit the resources that are currently available to them.

When the responses are compared in terms of the format, electronic or paper, by which the respondents answered the questionnaire, some notable differences in the way in which information is accessed can be ascertained. While consulting one's own material is the most popular response and searching LCS outside the library, searching online bibliographic databases in the library, and searching online databases outside the library are the least common methods of accessing information for both groups, there is a divergence of opinion between the two groups as to the other means of accessing information (Table 20).

As can be seen from the Table 20, the answers from those individuals who responded via the paper questionnaire are what one might anticipate from typical faculty users of the library. However, among those who responded electronically, the situation is somewhat different. Most notably, LCS is used as means of accessing information far more frequently by those who responded electronically than by those who responded by paper. Although the use of LCS is very popular with the electronic users, they are less inclined to use the card catalog as a resource. In addition, those who responded electronically are less prone to seek out the assistance of library personnel.

The importance of access to LCS both in the library and outside the library is far more important to those who responded electronically than to those who responded by paper, regardless of discipline (Table 21). Although those who responded to the paper questionnaire had noted that they were more inclined to seek out the assistance of library personnel, they valued the importance of this means of accessing information as little as did those who responded electronically.

TABLE 20

Present Means of Accessing Information by Method of Response

Means of Access	Paper			Electronic		
	Rank	N	%	Rank	N	%
Consult Own Books	1	569	92.5	1	100	92.6
Consult Card Catalog	2	556	90.4	2	82	75.9
Use References in Books or Journals	3	541	88.0	4	81	75.0
Consult Colleague	4	520	84.6	4	81	75.0
Search Indexes & Abstracts	5	464	75.4	6	79	73.1
Consult Library Staff	6	459	74.6	9	57	52.8
Use Library Reference Tools	7	446	72.5	7	74	68.5
Browse Stacks	8	438	71.2	8	69	63.9
Search LCS in the Library	9	393	63.9	2	82	75.9
Search LCS Outside the Library	10	189	30.7	9	57	52.8
Search Online Bibliographic Databases in Library	11	188	30.6	11	33	30.6
Search Online Bibliographic Databases Outside the Library	12	76	12.4	12	27	25.0

N = the number of "yes" responses to each specific question. The percentage is the expression of the number of "yes" responses.

TABLE 21

Importance of Means of Accessing Information by Method of Response

Source Used	Paper		Electronic	
	Rank	Weight	Rank	Weight
Own Materials	1	2.72	3	2.47
References in Books and Journals	2	2.62	4	2.43
Card Catalog	3	2.44	8	2.01
LCS in the Library	4	2.31	1	2.62
Colleague	5	2.21	7	2.25
Indexes & Abstracts	6	2.29	6	2.28
Online Bibliographic Databases in the Library	7	2.18	10	1.91
Library Reference Tools	8	2.15	9	2.01
LCS Outside the Library	9	2.05	2	2.61
Online Bibliographic Databases Outside Library	9	2.05	5	2.33
Library Staff	11	1.98	11	1.89
Browse Bookstacks	12	1.95	12	1.80

Enhancements

In an attempt to learn what improved service, particularly within the realm of automation, users were interested in seeing the Library develop, three categories of questions were asked: enhancements to the online circulation system, improved database access, and development of new systems (Table 22). The first two categories would require only the acquisition of more hardware, more staff time for training users, and/or the acquisition of more databases. The third category, 24-hour online reference system and online reserve system, required the development of new systems.

Among members of all three disciplines the most important enhancements requested were for more LCS terminals in dispersed locations and increased training for end-user online database searching. The least popular enhancements were for Machine Readable Data Files and increased baud rate of LCS terminals. Humanities' concerns were most strongly focused on improved LCS services while sciences and social sciences were split between LCS services and online database services. With the exception of more LCS terminals, none of the groups was particularly interested in the hardware upgrading of these services. Furthermore, the development of new services ranked only moderately well. An online reserve system ranked fifth with social scientists, sixth with humanists, and eighth with scientists. The 24-hour online reference system ranked only fourth with scientists, eighth with social scientists, and ninth with humanists.

Table 23 illustrates that electronic respondents again constitute a unique group. They share an interest with others in having more LCS terminals available throughout the campus and more dialup access. In addition, online 24 hour reference service and the ability to request interlibrary loan materials appeal to these users. While obtaining information with the aid of a library staff member is only of moderate concern, there is substantial interest in using a computer-based communication system to reach that staff. Also of importance is interest in the library's offering more commercial bibliographic databases and providing training so users can search the databases themselves. Beyond just a different set of interests, it should be noted that the intensity of response for enhanced services is often much greater. Among the electronic users the six most important enhancements rate higher than the top choice of the mail respondents.

TABLE 22

Importance of Enhancements For Improved Service by Discipline

Enhancement	Science		Social Science		Humanities		Librarians	
	Rank	Weight	Rank	Weight	Rank	Weight	Rank	Weight
More Dialups to LCS	1	2.04	2	1.97	5	1.76	4	2.22
Training to Do Own Online Database Searching	2	2.00	3	1.82	2	1.86	5	2.03
More LCS Terminals in Dispersed Locations	3	1.83	1	2.08	1	2.05	2	2.39
24 Hour Online Reference Service	4	1.81	8	1.62	9	1.48	14	1.46
More Online Bibliographic Databases	5	1.77	6	1.76	8	1.50	8	1.87
More LCS Training	6	1.75	3	1.82	2	1.86	5	2.03
Online Interlibrary Loan System	7	1.71	9	1.60	10	1.44	10	1.68
Electronic Reserve System	8	1.62	5	1.80	6	1.68	9	1.73
More Printers for LCS	9	1.54	10	1.59	6	1.68	3	2.27
Online Services, e. g. The Source	10	1.46	11	1.57	12	1.23	10	1.68
More LCS Terminals in Central Locations	11	1.45	7	1.72	4	1.77	1	2.56
Higher Baud Rate for LCS Terminals	12	1.28	14	1.38	13	1.16	7	1.88
Machine Readable Data Files	13	1.21	12	1.40	14	.91	12	1.67
Terminals for Loan	14	1.19	12	1.40	11	1.40	13	1.51

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TABLE 23

Importance of Enhancements For Improved Service by Format

Enhancement	Paper Rank	Paper Weight	Electronic Rank	Electronic Weight
Training to Do Own Online Database Searching	1	2.00	6	2.04
More LCS Terminals in Dispersed Locations	2	1.99	4	2.07
More Dialups to LCS	3	1.91	1	2.29
More LCS Training	4	1.82	10	1.85
Electronic Reserve System	5	1.67	8	1.86
More LCS Terminals in Central Locations	6	1.65	7	1.96
More Online Bibliographic Databases	7	1.64	3	2.09
More Printers for LCS	8	1.60	8	1.86
24 Hour Online Reference Service	9	1.54	2	2.26
Online Interlibrary Loan System	10	1.53	5	2.06
Online Services, e. g. The Source	11	1.47	14	1.42
Terminals for Loan	12	1.31	13	1.47
Higher Baud Rate for LCS Terminals	13	1.24	11	1.75
Machine Readable Data Files	14	1.20	12	1.50

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Online Searching

Because of the importance attached to online searching by librarians, six items in the survey were intended to elicit

information about the respondents' use of and attitude toward online searching, either through an intermediary or by him/herself (Table 24). A seventh item in the section on number of hours spent using a microcomputer or a mainframe to access machine-readable data files will be disregarded in this discussion, since the wording of the item does not discriminate between accessing the data through commercial vendors or campus resources, e. g. University of Illinois Survey Research Laboratory or from files the respondents have created themselves.

Respondents were more likely to engage in searching through intermediaries rather than as end-users, possibly reflecting the lack of both the availability of user friendly systems for the end-user and availability of microcomputers until recently.

Although online database searching within the library is heavily used by librarians (61.9%), this response probably reflects job-related activity rather than searching done for personal research. Next in frequency of use were scientists, PLATO respondents, paper respondents, and CYBER users. The least use was by persons in the humanities, where there is a paucity of available databases.

When queried about the importance of online searching using intermediaries in their information-seeking activities, the respondents answered somewhat differently. PLATO users valued online searching through intermediaries most highly. Humanities respondents, social scientists, and CYBER users, all closely grouped, also considered online searching within the library as relatively important. Interestingly, librarians, who were the heaviest users, rated this service as least important.

Most of the end-user searching was done by the PLATO respondents, closely followed by the librarians and the CYBER respondents. Among the disciplines, the now-familiar pattern emerged; the sciences, the social sciences, and then the humanities, though, as the figures indicate, the percentage having done end-user searching was small for all of them. When asked to rate its importance, the PLATO respondents' opinions reflected their use pattern; their median response was highest of a 1. Except for persons in the humanities, respondents rated end-user searching between very important and somewhat important. However, there is interest in having the library offer training for end-user searching.

TABLE 24

Online Searching: Composite

Activity		Science	Social Science	Humanities	Librarians	Paper	PLATO	CYBER
Searching Online in the Library:								
Used	-	35.9%	26.0%	19.9%	61.9%	30.6%	32.4%	29.6%
Importance	-	1.67	2.00	2.03	1.37	1.74	2.25	2.00
Performing Online Searches Oneself Outside Library:								
Used	-	16.4%	12.3%	9.1%	28.6%	12.4%	29.7%	22.5%
Importance	-	1.57	1.46	2.33	1.31	1.74	1.29	1.50
Availability of More Online Bibliographic Databases:								
Importance	-	2.14	2.13	2.54	2.00	2.30	2.00	1.69
More Machine Readable Data Files:								
Importance	-	2.86	2.64	3.19	2.35	2.90	NR	2.62
Availability of Online Services:								
Importance	-	2.46	2.31	2.79	2.17	2.41	2.75	2.57
End-User Training:								
Importance	-	1.85	1.73	2.01	1.71	1.83	NR	1.87

NR = No Response

EVALUATION OF RESEARCH

Traditional Library Services

Traditional means of library access are still important in the total research patterns of scientists, social scientists, and humanists. Consulting the card catalog and searching indexing and abstracting tools remain viable means of accessing information. What is noteworthy is that both of these standard research activities are rated more highly than searching online databases either inside or outside the library.

Traditional library services in the coming electronic age would still seem to be a vital part of research methods employed by all groups surveyed. Within a few years, responses might change dramatically as the population becomes more knowledgeable about and comfortable with computers and their ability to perform sophisticated tasks. During analysis of the results of the invisible user survey we found that the enhancements requested by respondents related most strongly to traditional library services including access to collections.

Online Bibliographic Services

Online searching is a relatively new service (1977) offered by the University of Illinois at Urbana-Champaign Library with searching done on a cost recovery basis for telecommunication and vendor charges. Other costs, including librarian's time, are absorbed by the library. Few units offering the service have actively promoted online searching, and publicity of online services has tended to be limited to word-of-mouth, classroom demonstrations and assignments, and library handouts. Perhaps these factors coupled with the increasing costs of searches have contributed to the comparatively low use of the service revealed by the survey. Of those availing themselves of the service, many consider online searching as a supplementary method of searching indexing and abstracting tools.

If online searching is to have a meaningful place in the future of libraries, the service must become more integrated into the total library program. Specifically, it is essential that end-user training be offered to those individuals who prefer to search online bibliographic databases for themselves. Librarians also need to develop user-friendly interfaces with current systems so that end-user online searching will be more attractive to patrons. In addition, public services librarians must become actively involved in the development of gateway systems which allow for the linking

of vendor-based bibliographic systems with online catalogs and circulation systems, thus developing the potential for interactive systems which provide the largest possible bibliographic resources for the users.

Services to Electronic Users

Planners of library service must recognize that the traditional and the invisible user are both seekers of information, information which is a library's raison d'etre. Yet in this electronic age, there is a group of users who do not come to the physical library building to obtain that information. Their interests, work habits, and hours do not permit library use in the traditional sense. Online catalogs as well as access to automated circulation systems, available at hours when the library itself is closed, are a boon to the invisible user. The enhanced services of interest to this group of respondents--24 hour reference service, placing items on reserve electronically, automated submission of interlibrary loan requests, more online databases available and training to search those databases, more dialup to the library's automated systems, and more dispersed terminal access to the library's systems--are not radical changes in service or concept. These services are merely traditional library services offered through electronic mail and networking. If libraries fail to recognize and design services to meet the information-gathering habits of some of their clientele, the invisible users, those users are going to circumvent the library and establish their own services and networks.

In this rapidly changing environment with technology becoming obsolete almost overnight and computer literacy growing widespread, librarians need to monitor the pulse of those changes and be aware both of the proliferation of the numbers of invisible users and of their changing information-gathering habits. Once that assessment is made, library planners must use that information to build service models that will facilitate and enhance the information access processes of that group.

Research Design Issues

One of the particular concerns in undertaking this project was the opportunity to explore the use of an online survey instrument. Other research on the use of online questionnaires has had only limited applicability to the concerns addressed in the research. Findings, for example, that questions of a personal and perhaps disturbing nature are more likely to be answered honestly on an automated

questionnaire than in a face-to-face interview are really of little relevance in this situation. On the other hand, the suggestion that respondents to online questionnaires may be more likely to give extreme answers than they would to face-to-face interviewers is more to the point and is possibly echoed in our data concerning number of hours spent a week on the various activities (O'Brien and Dugdale, 1978; Evans and Miller, 1969; Bartram and Bayless, 1984).

Nevertheless, the primary concern in using an online questionnaire was to see if those who responded by this means did, in fact, constitute a unique population. While such a survey instrument is a viable method of surveying non-traditional library use, the use of an online survey did suggest a number of considerations. These issues need to be kept in mind when reviewing the results or designing an online survey.

The first problem we encountered which has already been mentioned in passing involved the selection of respondents. Given the limitations of both the PLATO and CYBER systems, selecting a random or stratified sample of their user groups was not possible. In the case of the PLATO system any individual on the UIUC campus has access to a large number of public PLATO terminals. Furthermore, PLATO access is also possible in a large number of remote sites throughout North America. Consequently there was no clearly identifiable user group from which to select a sample in advance.

In the case of CYBER users, who must register with the University before they can receive a password, the University's inability to identify a user population from which we could select a sample was less understandable. Consequently, in both automated systems it became necessary to draw the sample of respondents simply by advertising the questionnaire on that system and allowing the respondents to self-select themselves.

This self-selection mandated the need to publicize the online questionnaire as widely as possible. Unfortunately, notices about the questionnaire appeared in campus publications too early when technical problems prevented the loading of the online questionnaire within the time frame of the original calendar. When those technical difficulties were finally overcome, there was not enough time to run the notices again and still conduct the study before the end of the semester and hence the exodus of the user population. Timing of publicity is a crucial factor. Because of the inability of either system to identify those individuals who held computer accounts, it was impossible to send each potential PLATO or CYBER user a notice about the questionnaire. Instead, in both cases it was necessary to rely on those systems' electronic

bulletin boards. Based on our own experience and anecodotal evidence this was not a particularly effective method of publicizing the survey.

In terms of the online survey instrument itself there was also a cluster of difficulties which may have influenced the nature of the response. The first was the respondent's inability to do a preliminary scan of the questionnaire in order to establish an overall context for interpreting or understanding individual questions. The structure of the online version of the questionnaire was such that only one question at a time was available to the respondent. Compounding this difficulty was a second problem of limited answer revision. The structure of the online questionnaire required that each question had to be answered before the respondent could move on to the next question. If a respondent changed his/her mind after answering a question it was possible to change the response (by backspacing and retyping the answer) only if the respondent were using a CRT and if the subsequent question had not yet appeared. It was not possible to return to an earlier question and change an answer, and for respondents using printer terminals it was not possible to correct an answer even while still on the question.

A third problem with the structure of the CYBER version of the questionnaire was the requirement that every question had to have an answer before it was possible to move to the next question. Although the prompts were nicely worded, it may well be that some of the extreme answers given on the online questionnaire were the result of frustration due to the system's requirement for an answer.

A fourth difficulty, based on limited anecdotal evidence but carrying a commonsense ring of truth, was frustration with hardware limitations when the online version of the survey was accessed by printer rather than CRT terminals via dialup. Not only did the printer terminals limit the respondent's already limited ability to change answers, but the 300 baud rate of the terminals was annoyingly slow.

A final cluster of concerns involved both the online and paper version of the questionnaire. Although both instruments were pretested and modified as a result of that pretesting, complaints were received about the nature of the questionnaire in two areas. The first area of complaint was the use of computer jargon which at times puzzled and confused people. Although a special effort had been made when constructing the questionnaire items to avoid jargon and further "jargon" was removed after pretesting, it still seemed to cause at least a limited problem in the final version of the questionnaire. The second area of complaint was the extensive section on the

use of microcomputers and mainframes which came early in the questionnaire. According to anecdotal evidence, confirmed by our own impressions, this section of the online version was tedious and may have contributed to the lower electronic response rate since it was not possible to see the questions ahead.

While it is clear that certain reservations must be kept in mind when reviewing the data from the online version of the questionnaire, we do feel that our experience with the online survey has been fruitful. Not only have a number of important methodological considerations been brought to light in the design of online questionnaires but they do seem to provide an important instrument for accessing a distinct and important user population who might ignore more traditional user surveys.

IMPLICATIONS

New Services

While the user needs study at the University of Illinois reveals that at least for the near future, that is the next five years, the present modes of accessing information are quite satisfactory for a large number of the sample, reponses from both the mail and the electronic questionnaire illustrate the necessity to improve services to the users. Electronic access to the library has already begun on two fronts: automated circulation systems and online catalogs and vendor-based online bibliograhic systems.

Automated circulation systems and online catalogs must have the capability to extend outside the walls of the library, and these systems must be able to expand to accommodate access by the individual user, either by telephone dialup or another type of network connection. It is dubious to refer to a system as "user-friendly" if it provides access only within the confines of a single building for a limited number of hours each week. Many of the current library automation systems strongly reflect management needs rather than user needs. Even within a system like LCS which allows usage outside the confines of the library, we see a continual flow of requests for more dialup ports.

Beyond assuring that current library technology will be available to the user who can access systems electronically, libraries need to link to computer-based communication networks. Within a framework of academia, there is a growing concern by universities and units therein, such as Colleges of Engineering, to develop these computer networks. Such networks which link computers to each other provide an

excellent opportunity for libraries to participate in systems which are actively used by invisible users. Library automated circulation systems and online catalogs should be able to interface with these systems. More importantly, such a unified system should include an electronic mail capability which will allow librarians an effective and appropriate avenue of communication with invisible users. Our questionnaire alluded to at least two possible applications for using an electronic mail system. One was the ability for faculty to place materials on reserve for courses via the computer. Using the electronic mail capability, the faculty member could call up a standardized form that s/he would fill out on the computer. Each reserve request item would automatically interface with the online circulation system to determine if the item was owned and available. If available, it would be paged for reserve and the request incorporated into an automated reserve system with an electronically produced status report routinely generated to the requestor.

Most reference queries in academia can be defined as either data oriented or citation oriented. An online 24-hour reference system could be made up of two components which would fulfill these two types of queries. To meet, at least partially, the needs of the data oriented query, a reference database, similar to the reference question files which many reference desks now maintain, could be constructed to provide answers and sources for the most frequently asked questions. Citation oriented questions could be answered through an electronic mailbox. The invisible user could leave messages and reference queries that would be responded to at a later time when the librarian checked his or her mailbox. This approach has particular appeal in a world in which reference librarians have irregular hours and/or at least some of the patrons work at hours when the library is not open.

Role of the Librarian

The library world, although it might not admit it, has already begun to impose an electronic environment upon its patrons. Online searching and the growing number of online catalogs are evidence of administrative decisions which expose all library users to computer technology in an immediate sense. Online journals and indexes also introduce users to the electronic world. These are some of the tools, then, which public service librarians can use to serve both the traditional and the invisible user better.

Within this new setting, questions arise regarding the role of the librarian. Those who contemplate the future and the impact of automation envision a world where academic librarians would function as information consultants who would

advise users how to exploit the proliferating online systems effectively and train end-users to do their own searching (Lancaster 1980). Other functions might be as keepers of repositories of material not available in an electronic format or as providers of service to users as librarians do now, particularly for some users who, due to unavailability of databases, economy, or personality, choose to make use of traditional library service. Another role might see academic librarians become more involved in the creation of online databases, both from the standpoint of bibliographic control and the creation of user-friendly interfaces.

The future may well see librarians functioning in one or several of the above capacities, but the results of this study reveal that the paperless society is not as imminent as might be expected and that the means of information seeking and the importance of the kinds of information activity may vary among users. For the foreseeable future, certainly the next five years, public services librarians will continue to devote considerable attention to services they now provide, such a reference work, bibliographic instruction, and online searching.

These services are still of prime importance to many of our present users and we will continue to try to meet those needs. However, the profession must be aware of the emergence of a new group of users, the invisible users, and plan to facilitate the information needs of these patrons as well. Dialogue with these users is crucial if the library is to continue to be a part of the information-gathering processes of these people. Our initial assessment of the information habits of the electronic user reveals a user who seeks information in traditional ways but prefers using a computer to obtain that information at his/her own pace and in his/her time frame, so the services offered this user are not as radical as they might seem at first glance. Thus, this changing environment provides public services librarians an opportunity to evaluate their users' needs and the services provided them. However, librarians must participate in this process of assessing the population and its needs and plan to meet the changing needs of those people and be a participant and initiator in the dialogue, or our electronic users will bypass the library and establish their own networks and databases. As a result, we will see some immediate planning to implement online services involving reference, interlibrary loan requests, and reserves. We may very likely see the implementation of online services for some users and a continuation of traditional services for others within one academic institution, a situation not unlike that occurring at the present time. The challenges that are to be met may mean modifications of our traditional responses, but there may be even greater opportunities for librarians.

The Research as a Management Tool

One of the benefits of this project has been the opportunity for the Director's Council to undertake an administrative project which permitted each member of the group to look at how we serve or might serve users on a campus-wide basis, not merely from the narrower perspective of the libraries each assistant director represents. The project allowed us to focus on a single issue which gave perspective to what the library is about. This group now has data on which to build goals and objectives which reflect the information needs of our users, both the more traditional user as well as the invisible user. In this respect, quite apart from the actual study, the undertaking of such a project by the members of the Director's Council has become a powerful administrative tool. The process itself has been a valuable experience. Task oriented projects can be used by administrators as a management device to foster group cohesiveness as well as permit brainstorming and planning for the future.

Based upon the results of the study and the electronic systems already in place, the Departmental Library Services at the University of Illinois at Urbana-Champaign intend to work to expand services into the realm of electronic-based information systems. Already in place is an automated circulation system and online catalog that link the majority of academic libraries in the state. As the University develops an information-linked communication network we plan to expand reference, interlibrary loan activies, and reserves to utilize these resources.

Future Research

The first step to future research will be the refining and expanding of the research tools utilized in this study. As has been noted earlier, it will be necessary to refine the questionnaire within the electronic environment. In addition, computer conferencing, a technique which we intended to use in the study, will be employed to elicit extended reponses from invisible users.

After the research was completed, the University of Illinois implemented its online catalog. Since the online catalog is available to users both within the library setting and remotely by dialup, a study of its users provides an excellent followup to the initial study as to user behavior in an electronic library. Whereas it had been possible in the past to avoid automation within the University of Illinois Library, the online catalog makes such avoidance impossible, primarily due to the closing of the card catalog. The data

from the present questionnaire will serve as a baseline for measuring user behavior, searching techniques, and attitudes towards electronic access. The study will be conducted after the online catalog has been in operation for at least one year.

A third direction for future research is the development of end-user access to online bibliographic databases. Microcomputer technology offers an excellent opportunity to develop user-friendly software to more easily facilitate end-user searching.

Finally, we intend to develop a monitoring device to continue to ensure that the needs of invisible users are accommodated. While the study revealed that those individuals who could be labeled invisible users represent only a small segment of the total respondents, technology is in their favor. Public service librarians must be cognizant of their information needs and user behavior if they are to serve this clientele satisfactorily.

REFERENCES

American Psychological Association. (1963-1969). (Vols. 1-20). Report of the project on scientific information exchange in psychology. Washington: American Psychological Association.

Annual Review of Information Science and Technology. (1968-1978). (Vols. 3-7, 9, 13). Washington: American Society for Information Science.

Bartram, D. and Bayliss, R. (1984). Automated testing: Past, present and future. Journal of Occupational Psychology, 57, 221-237.

Bates, M. J. (1971). User studies: A review for librarians and information scientists. Washington: U. S. Department of Health, Education and Welfare, Office of Education. (ERIC ED 047 738).

Bebout, L. Davis, D., Jr., and Oehlerts, D. (1975). User studies in the humanities: A survey and a proposal. RQ 15, 40-44.

Brittain, J. M. (1970). Information and its users: A review with special reference to the social sciences. New York: Wiley.

Evans, W. M. and Miller, J. R., III. (1969). Differential effects on response bias of computer vs. conventional administration of a social science questionnaire: An exploratory methodological experiment. Behavioral Science, 14, 216-227.

Faibisoff, S. G. and Ely, D. P. (1976). Information and information needs. Information Reports and Bibliographies, 5(5), 2-16.

Hiltz, S. R. (1977). Computer conferencing: Assessing the social impact of a new communication medium. Technological Forecasting and Social Change, 10, 225-238.

Hiltz, S. R. (1978). The computer conference. Journal of Communication, 28, 157-163.

Hiltz, S. R. (1981). The impact of a computerized conferencing system on scientific research communities (Research Report No. 15). Newark, NJ: New Jersey Institute of Technology. (ERIC ED 207 853).

Hiltz, S. R. and Turoff, M. (1978). The network nation - human communication via computer. Reading, MA: Addison-Wesley.

Husbands, B. (1982). Electronic mail: Applications for management. Journal of Systems Management, 33(8), 6-8.

Institute for the Future. (1974-1978). Group communication through computers. (Vols. 1-4). Menlo Park, CA: Institute for the Future.

Kerr, E. B. and Hiltz, S. R. (1982). Computer-mediated communication systems. New York: Academic.

Lancaster, F. W. (1980). Libraries and the Information Age. ALA Yearbook, 1980, pp. 9-19. Chicago: ALA.

Line, M. B., (1971). The information uses and needs of social scientists: an overview of INFROSS. Aslib Proceedings, 23, 412-434.

Menzel, H. (1960). Review of studies in the flow of information among scientists. New York: Columbia University, Bureau of Applied Social Research.

Menzel, H. (1966). Information needs and uses in science and technology. In, Annual review of information science and technology, (Vol. 1, pp. 41-69). Washington: American Society for Information Science.

O'Brien, T. and Dugdale, V. (1978). Questionnaire administration by computer. Journal of the Market Research Society, 20, 228-237.

Paisley, W. (1965). The flow of (behavioral) science information: A review of the research literature. Stanford, CA: Stanford University, Institute for Communication Research.

Stone, S. (1982). Humanities scholars: Information needs and uses. Journal of Documentation, 38, 292-313.

Wood, D. N. (1971). User studies: A review of the literature from 1966-1970. Aslib Proceedings, 23, 11-23.

1-5

APPENDIX: QUESTIONNAIRE
University of Illinois Library

Survey of Electronically Based Library Services

Section I. Present Computer Activities. (Please circle the items which apply to you and provide any additional information requested.)

1. Do you have access to

a. microcomputer — Yes . . . . . 1 — 6
No 2

b. terminal — Yes . . . . . 1 — 7
No 2

c. can you use either to access multiple databases — Yes . . . . . 1 — 8
No 2

If the answer is no to all three questions, please skip to Section II.

2. Is the above located in your (circle all that apply)

home . . . . . 1 — 9
office . . . . . 2 — 10
laboratory . . . . . 3 — 11
department . . . . . 4 — 12
other locations (please specify) . . . . . 5 — 13

_____

_____

3. Which mainframes do you use on campus?

a. CYBER . . . . . 1 — 14
PLATO . . . . . 2 — 15
IBM . . . . . 3 — 16
Other (please specify). . . . . 4 — 17

_____

b. Do you have a CYBER account?
Yes . . . . . 1 — 18
No 2

c. Are you registered with PLATO? — Yes . . . . . 1 — 19
No 2

4. Do you utilize any mainframe systems off campus?

Yes 1 20
No 2

If yes, please specify. _____

_____

5. Please indicate the hours a week you spend in each of the following activities using a microcomputer (MC) and/or mainframe (MF).

Activity	MC Hours Per Week	MF Hours Per Week	
(1) instruction	_____	_____	21-24
(2) programming	_____	_____	25-28
(3) personal research	_____	_____	29-32
(4) data analysis	_____	_____	33-36
(5) modeling	_____	_____	37-40
(6) graphics	_____	_____	41-44
(7) creative work (e.g., art, music)	_____	_____	45-48
(8) accessing Machine Readable Data Files	_____	_____	49-52
(9) personal management	_____	_____	53-56
(10) administrative management	_____	_____	57-60
(11) word processing	_____	_____	61-64
(12) conferencing/electronic mail	_____	_____	65-68
(13) amusement/games	_____	_____	69-72
(14) other (please specify)	_____	_____	73-76

_____ 77-79/BK 80/1

1-5/DUP

Section II. Methods Used to Obtain Information

1. Current methods used to obtain information.

Of the following methods you presently use to access information, please indicate their importance to you with (1) as most important, and (4) as least important.

		Do you use?		If yes, how important is this method of access to you?				
		Yes	No	very important	somewhat important	not very important	not at all important	
(1)	Consulting library card catalog.	1	2	1	2	3	4	6-7
(2)	Consulting a colleague	1	2	1	2	3	4	8-9
(3)	Consulting own books and journals.	1	2	1	2	3	4	10-11
(4)	Consulting a library staff member	1	2	1	2	3	4	12-13
(5)	Browsing the Library stacks.	1	2	1	2	3	4	14-15
(6)	Searching indexing and abstracting tools (e.g., Magazine Index, Psychological Abstracts, Physics Abstracts).	1	2	1	2	3	4	16-17
(7)	Consulting library reference books (e.g., bibliographies, handbooks).	1	2	1	2	3	4	18-19
(8)	Searching the Library Circulation System (LCS) via terminals in the Library.	1	2	1	2	3	4	20-21
(9)	Searching LCS via terminals outside the Library.	1	2	1	2	3	4	22-23
(10)	Searching online bibliographic databases using terminals or microcomputers within the Library.	1	2	1	2	3	4	24-25
(11)	Performing myself online database searches using terminals or microcomputers outside the Library.	1	2	1	2	3	4	26-27
(12)	Bibliographies or reference in books or journals.	1	2	1	2	3	4	28-29

2. Potential future methods of improving access to information. Of the following improvements; please indicate their importance to you with (1) as most important, and (4) as least important.

	very important	somewhat important	not very important	not at all important	
(1) More LCS public terminals in central locations (e.g., Main Library, Undergraduate, etc.).	1	2	3	4	30
(2) More LCS public terminals in dispersed locations (e.g., departmental libraries, offices, Illini Union, etc.).	1	2	3	4	31
(3) More printers available for use with public terminals	1	2	3	4	32
(4) Public terminals with a higher baud rate.	1	2	3	4	33
(5) Terminals available for loan for use in offices and at home.	1	2	3	4	34
(6) Improved training for accessing LCS and online catalog.	1	2	3	4	35
(7) More dialup capability to access LCS and the online catalog with home or office computers.	1	2	3	4	36
(8) Make reference service available online on a 24 hour basis.	1	2	3	4	37
(9) Capability of transmitting inter-library loan requests on a 24 hour basis.	1	2	3	4	38
(10) Capability of putting items on reserve electronically.	1	2	3	4	39
(11) Availability of more online bibliographic databases.	1	2	3	4	40

(12) Please specify which ones.

_____

2. Potential future methods of improving access to information (continued).

	very important	somewhat important	not very important	not at all important	
(13) Availability of more Machine Readable Data Files (e.g., Census Tapes).	1	2	3	4	41

Please specify which ones.

_____

(14) Availability in the library of online services (e.g., The Source, CompuServe, etc.).	1	2	3	4	42
(15) Additional and improved training for individuals wanting to access to online databases themselves.	1	2	3	4	43

Section III. Demographic data. (Please circle the items which apply to you and provide any additional information requested.)

1. Status

a. Faculty

professor . . . . . 1 — 44
associate professor 2
assistant professor 3
other (please specify). . . 4

_____

b. Staff

academic professional . . . 1 — 45
research associate. 2
non-academic. 3
other (please specify). . . 4

_____

c. Student

undergraduate . . . . . 1 — 46
graduate. 2
professional (e.g., law, medicine, etc: please specify 3

_____

2. Years on campus ____ 47-48

Section III. Demographic data (continued).

3. Administrative title (if applicable) _____ 49-50

_____

4. Primary department/unit/major _____ 51-54

_____

5. Age 55

16-25 1
26-35 2
36-45 3
46-55 4
56-65 5
66— 6

6. Sex 56

male. 1
female. 2

Additional Comments:

_____

_____

_____

_____

_____

_____

_____

Thank you. Please return in the enclosed envelope using Campus Mail. 57-78/B 79/2